

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/000206

International filing date (day/month/year)
20.01.2004

Priority date (day/month/year)
13.06.2003

International Patent Classification (IPC) or both national classification and IPC
G06F9/318, G06F9/30

Applicant
ARM LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer

Thibaudeau, J

Telephone No. +49 89 2399-2349



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/GB2004/000206

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/000206

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|----------------------------------|
| Novelty (N) | Yes: Claims | 3,4,7-11,14,15,18-22,25,26,29-33 |
| | No: Claims | 1,2,5,6,12,13,16,17,23,24,27,28 |
| Inventive step (IS) | Yes: Claims | 7-11,18-22,29-33 |
| | No: Claims | 3,4,14,15,25,26 |
| Industrial applicability (IA) | Yes: Claims | 1-33 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

1. Reference is made to the following documents:

D1: KRISHNASWAMY A ET AL: "Profile guided selection of ARM and thumb instructions" SIGPLAN NOTICES, ASSOCIATION FOR COMPUTING MACHINERY, NEW YORK, NY, US, vol. 37, no. 7, July 2002 (2002-07), pages 56-64, XP002309544 ISSN: 0362-1340

D2: US-A-6 002 881 (YORK ET AL) 14 December 1999 (1999-12-14)

2. **Item V: Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

D1 discloses an apparatus (and the corresponding method and computer program product) for processing data. Said apparatus comprises: data processing logic operable to perform data processing operations and an instruction decoder operable to decode program instructions specifying data processing operations to be performed by said data processing logic and to control data processing logic to perform said data processing operations (see page 57, paragraph 2.1).

D1 further discloses that said instruction decoder is operable in a first mode in which program instructions of a first instruction set (ARM instruction set) are decoded and in a second mode in which program instructions of a second instruction set (Thumb instruction set) are decoded (see Figure 1 and page 57, paragraph 2.2).

The 32-bit ARM processor, in addition to supporting the 32-bit ARM instruction set, supports the 16-bit Thumb instruction set. Thus the instructions of the Thumb instruction set form, with a subset of program instructions of the ARM instruction set, a common subset of instructions, which represent at least one class of instructions. It is implicit, from the translation of the Thumb instructions into an equivalent ARM instruction (see page 57, paragraph 2.2), that the same data processing operations are performed independent of whether said instruction decoder is operating in said first mode or said second mode and that said instructions of the common subset have a common storage order compensated encoding.

It is to be noted that the features of claims 1, 12 and 23 are also disclosed in D2

which describes two different instruction sets (ARM and Piccolo instruction sets). Since Piccolo is an ARM processor, it executes part of the ARM instruction set, which therefore form a common subset of instructions. Although two different decoders are provided, no difference can be seen with the two different decoder modes of the independent claims which may correspond to several different decoders (see Figure 1 of the application). D2 further discloses that said instructions of the common subset have a common storage order compensated encoding (see column 10, lines 60-62).

As to the dependent claims, D1 and D2 both disclose a fixed length (32 or 16 bits) instruction set. The fact that instructions from the common subset are coprocessor instructions is not explicitly disclosed in the prior art. However coprocessor instructions are disclosed in D2 (see column 5, lines 21-26).

3. **Item VII: Certain defects in the international application**

- i) To meet the requirements of Rule 6.3(b) PCT the independent claims should be properly cast in the two part form, with those features which in combination are part of the prior art (see document D1) being placed in the preamble.
- ii) The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- iii) The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.
- iv) Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

INTERNATIONAL SEARCH REPORT

GB2004/000206

| | | |
|--|--|--|
| A. CLASSIFICATION OF SUBJECT MATTER | | |
| IPC 7 | G06F9/318 | G06F9/30 G06F9/318 G06F9/30 |
| According to International Patent Classification (IPC) or to both national classification and IPC | | |
| B. FIELDS SEARCHED | | |
| Minimum documentation searched (classification system followed by classification symbols) | | |
| IPC 7 G06F | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched | | |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used) | | |
| EPO-Internal, INSPEC, IBM-TDB | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | KRISHNASWAMY A ET AL: "Profile guided selection of ARM and thumb instructions" SIGPLAN NOTICES, ASSOCIATION FOR COMPUTING MACHINERY, NEW YORK, NY, US, vol. 37, no. 7, July 2002 (2002-07), pages 56-64, XP002309544 | 1,2,5,6, 12,13, 16,17, 23,24, 27,28 |
| A | ISSN: 0362-1340 page 57, paragraph 2.2; figure 1 | 3,4, 7-11,14, 15, 18-22, 25,26, 29-33 |
| ----- -/-- | | |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. | | |
| * Special categories of cited documents: | | |
| "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family | | |
| Date of the actual completion of the international search | | Date of mailing of the international search report |
| 12 August 2005 | | 26/08/2005 |
| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel: (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016 | | Authorized officer Thibaudeau, J |

INTERNATIONAL SEARCH REPORT

GB2004/000206

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|--|--|
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | US 6 002 881 A (YORK ET AL) 14 December 1999 (1999-12-14) | 1,2,5,6, 12,13, 16,17, 23,24, 27-33 |
| A | column 5, line 8 - line 43 | 3,4, 7-11,14, 15, 18-22, 25,26, 29-33 |
| | column 10, line 60 - line 62 column 13, line 57 - column 14, line 30 column 56, line 41 - column 57, line 19 | |
| A | US 2002/188826 A1 (ROSE ANDREW CHRISTOPHER ET AL) 12 December 2002 (2002-12-12) paragraphs '0004!, '0012! - '0015!, '0017!, '0068!, '0155! - '0166! | 1-33 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

GB2004/000206

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|----|---------------------|----------------------------|---------------------|
| US 6002881 | A | 14-12-1999 | GB 2326253 A | 16-12-1998 |
| | | | CN 1103961 C | 26-03-2003 |
| | | | DE 69801673 D1 | 18-10-2001 |
| | | | DE 69801673 T2 | 29-08-2002 |
| | | | EP 1010065 A1 | 21-06-2000 |
| | | | WO 9857256 A1 | 17-12-1998 |
| | | | IL 132681 A | 31-07-2003 |
| | | | JP 2002503370 T | 29-01-2002 |
| | | | RU 2195696 C2 | 27-12-2002 |
| US 2002188826 | A1 | 12-12-2002 | GB 2376098 A | 04-12-2002 |
| | | | CN 1522404 A | 18-08-2004 |
| | | | EP 1402360 A2 | 31-03-2004 |
| | | | WO 02097609 A2 | 05-12-2002 |
| | | | JP 2004538556 T | 24-12-2004 |